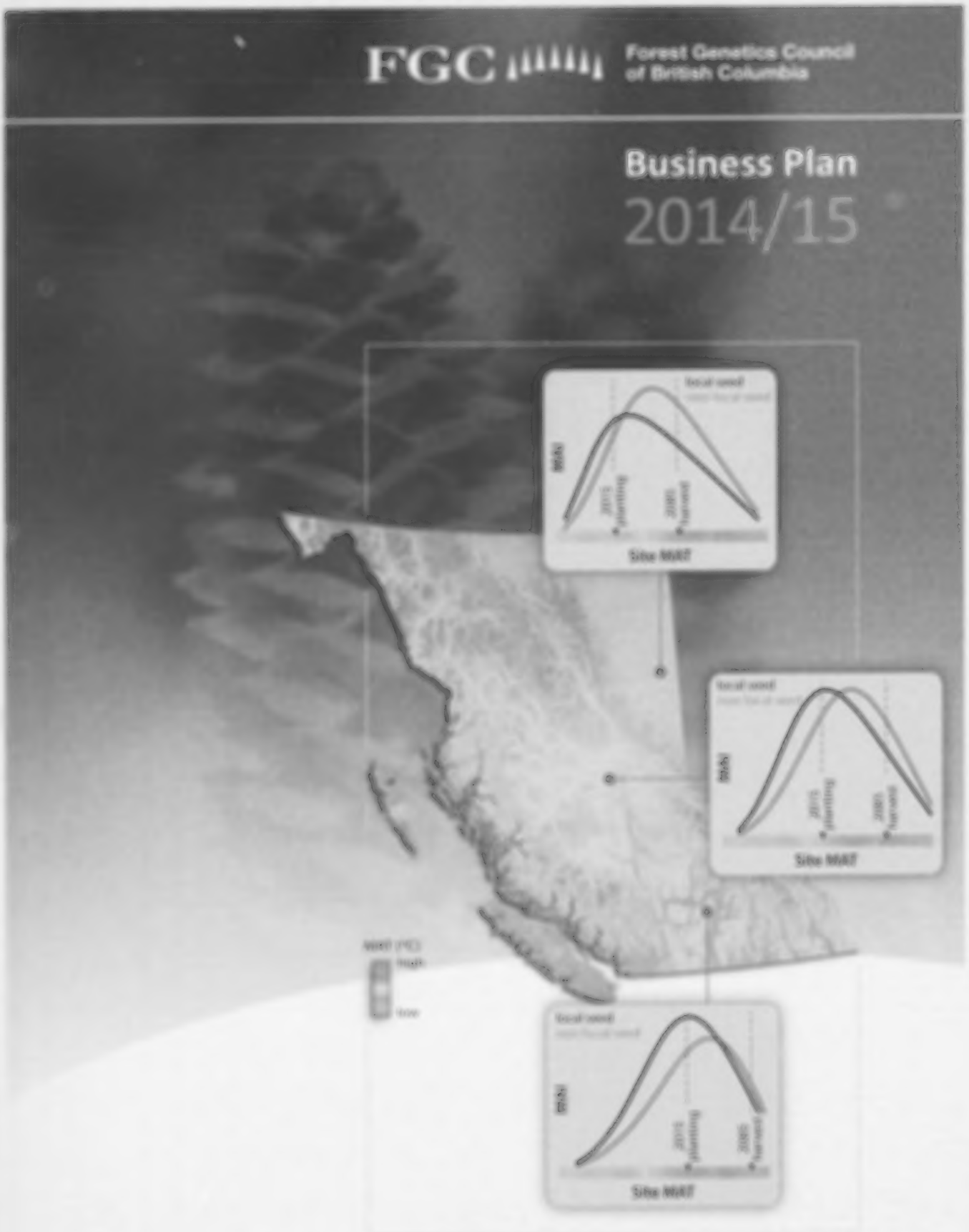
FGC Forest Genetics Council of British Columbia

Business Plan 2014/15



National Library of Canada Cataloguing in Publication Data

Forest Genetics Council of British Columbia
Business plan. – 2000/2001

Annual.
Title from cover.
Issuing body varies.
Running title: Forest Genetics Council of BC ... business plan.
ISSN 1496-1378 = Business plan – Forest Genetics Council of British Columbia

1. Forest Genetics Council of British Columbia – Periodicals. 2. Forest genetics – British Columbia – Periodicals. 3. Forests and forestry – Research – British Columbia – Periodicals. I. Forest Renewal BC. II. Title: Forest Genetics Council of BC ... business plan. III. Title: Forest Genetics Council of British Columbia business plan.

SD399.5.B74 634.9'8'09711'05 C2001-800896-8

Cover figure:
Lodgepole pine assisted migration

Provenance trials test seed sources from different climatic areas in common-garden field trials located on operational forestry sites. These trials act as de facto climate change laboratories, providing insight into the possible impacts of climate change on forest growth and health, and help to identify seed sources expected to perform best in a changing climate. In this example from the Illingworth lodgepole pine provenance trials established in the 1970s, the growth rate of local and a best non-local (migrated) seed source is modeled as the site temperature changes from the time of planting to the time of harvest (shown here for simplicity as mean annual temperature - MAT).

Productivity, measured as mean annual increment (MAI) in cubic meters per hectare, increases slightly as climate warms in some locations, but declines toward the end of the rotation at all locations. This expected decline in MAI can be partially or wholly mitigated by choosing seed sources from climatic areas that are best suited to expected future climates. Benefits from using the best non-local seed source are greater in cooler climatic areas, as existing local sources can be replaced with faster-growing sources from warmer climatic areas (see northern-most graph). In warmer and drier areas, increased warming may result in a substantial loss of productivity over the next rotation regardless of seed source, suggesting a shift to a species more suited to the warmer climate may be warranted for these sites.

Provincial seed transfer policy is expected to change incrementally and conservatively over time and as new research and climate-modelling information comes available. These changes will be designed to both minimize risk and mitigate (or enhance) productivity declines due to climate change.

Image prepared by C. Chourmouzis

Forest Genetics Council of BC

Business Plan 2014 / 15

Budgets list only funds provided by the
provincial Land-Base Investment Strategy
Tree Improvement Program

Budgets approved
by the Forest Genetics Council of BC on
March 19, 2014

Compiled and edited by

Jack Woods

FGC Program Manager

Message from the FGC Co-Chairs

We are pleased to present the Forest Genetics Council of BC's (FGC) 14th consecutive annual business plan. This plan, brought together by FGC's advisory committees and approved by FGC, summarizes activities funded through the provincial government's Land Base Investment Strategy (LBIS) and supported by various companies and agencies who contribute additional resources, time, and effort.

This plan reflects a reduction in LBIS contributions from $2.858 million in 2013/14 to $2.5 million. Noteworthy, however, is a contribution of over $150,000 from FGC-owned SelectSeed Ltd. for program management, meeting and publication costs, support for the development of species plans, and for consulting or research projects that broadly support the cooperative program.

This business plan outlines a balanced-set of priorities and actions that contribute to enhancing the conservation, resilience, and value of BC's forest genetic resources. Activities and budgets are grouped into subprograms, including select seed production, tree breeding, genecology, genetic conservation, cone and seed pest management, decision support, and extension. Collectively, these projects advance provincial-level objectives reported in FGC annual reports and the Ministry of Forests, Lands and Natural Resource Operations' Service Plans.

During the period of this plan FGC will develop a new 5-year strategic plan to establish new (or reaffirm existing) objectives for genetic conservation, select seed use, and climate-based seed transfer. This strategic plan will also help FGC and stakeholders respond to challenges such as the production of lodgepole pine seed in orchards, changing seed demand in the post-mountain pine beetle era, new seed transfer rules, staff succession, and incorporating new technologies (e.g. genomics) into policy and practice. Responding to these issues could precipitate significant changes to our breeding programs and seed orchards. The magnitude of these changes are not fully understood at this time, but will be implemented incrementally and reflected in future business plans.

We would like to thank all the people and organizations who contributed to this plan and who contribute on a daily basis to the overall provincial forest genetics conservation and management program. We would also like to thank our stakeholders in both government and industry for their support.

Larry Gardner, RPF
FGC Co-chair
West Fraser Timber Ltd.

Brian Barber, RPF
FGC Co-chair
Ministry of Forests Lands and Natural Resource Operations

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1.0 Introduction

This section overviews the relationship between the multi-stakeholder Forest Genetics Council and its co-operators in the planning and implementation of forest genetic resource management activities in British Columbia, and for the management and allocation of funds under the Land Base Investment Strategy (LBIS) Tree Improvement Program.

1.1 Forest Genetics Council of BC

The Forest Genetics Council of BC (FGC) is a multi-stakeholder group representing the forest industry, Ministry of Forests Lands and Natural Resource Operations (MFLNRO), universities and the Canadian Forest Service. Council's mandate is to lead a provincial forest genetic resource management (GRM) and tree improvement program that encompasses the conservation, controlled use, and value-enhancement of the genetic resources of forest tree species, and to advise the Provincial Chief Forester on forest genetic resource management policies and budgets.

The FGC reports to the Provincial Chief Forester, and provides a forum for stakeholder representatives to set objectives and to oversee the development and delivery of a cooperative Business Plan to fulfill these objectives. The vision statement and objectives set out in the FGC Strategic Plan for the period 2009 to 2014, are:

Vision statement:

BC's forest genetic resources are diverse, resilient, and managed to provide multiple values for the benefit of present and future generations.

Objectives:

1. Adequately conserve the genetic diversity of key populations of all forest tree species native to BC by 2015, through a combination of in situ, ex situ, and inter situ conservation.
2. By 2020, high-quality genecology research information will guide operationally efficient climate-based seed transfer policy and practice for all trees planted in BC.
3. Increase the average volume gain of select seed used for Crown land reforestation to 20% by the year 2020.
4. Increase select seed use to 75% of the provincial total sown by 2014.
5. Coordinate stakeholder activities and secure the resources needed to meet Business Plan priorities.
6. Monitor and report progress in genetic resource management activities.

This Business Plan defines the annual set of activities and budgets needed to achieve these objectives.

1.2 A Co-operative Effort

Forest genetic resource management in BC is a co-operative effort. The MFLNRO leads tree breeding activities, while both private industry and the MFLNRO manage seed orchards for the operational production of select seed. Genecology research is undertaken by the MFLNRO and universities in support of seed transfer policy, climate-change response, and genetic conservation. Industry provides logistical support for field trials and input on the development of priorities. Universities contribute through research in genetic conservation, genomics, climate modeling, and other aspects of GRM. Policy development for Crown lands is the responsibility of the MFLNRO, with advice provided to the Provincial Chief Forester through the FGC.

1.3 Land-Base Investment Strategy Tree Improvement Program

The Land-Base Investment Strategy (LBIS) encourages investments in the forest resource that maximize productivity and value while supporting forest resilience. The Tree Improvement Program supports specific implementation priorities related to timber supply, fast-growing forests, and adaptation to climate change.

FGC objectives align with MFLNRO and LBIS objectives for the enhancement of provincial timber supply and forest stewardship, and are set out in the FGC Strategic Plan for 2009 to 2014. The MFLNRO administers funding through the subprogram areas identified in the FGC Strategic and Business Plans (Figure 1).

Business planning carried out through the existing FGC led process, includes Technical Advisory Committees (TACs) undertaking specific planning activities, developing budgets, and making operational recommendations (Figure 2). The FGC reviews and makes final recommendations for subprogram budgets and activities, and ensures the overall program meets MFLNRO and LBIS objectives and administrative requirements. The program is managed and coordinated by the FGC Program Manager on behalf of the FGC, with substantial input from FGC Co-Chairs, Technical Advisory Committee (TAC) Chairs, and others.

In addition to LBIS Tree Improvement Program investments and MFLNRO direct program investments through staff and in-kind support, private companies also fund activities under Council's Business Plan. The species plans found in Appendix 3 outline general strategies, predict orchard seed production and gain, summarize conservation status, and provide key seed-use and availability statistics for individual species and seed-zone combinations known as seed planning units (SPU).

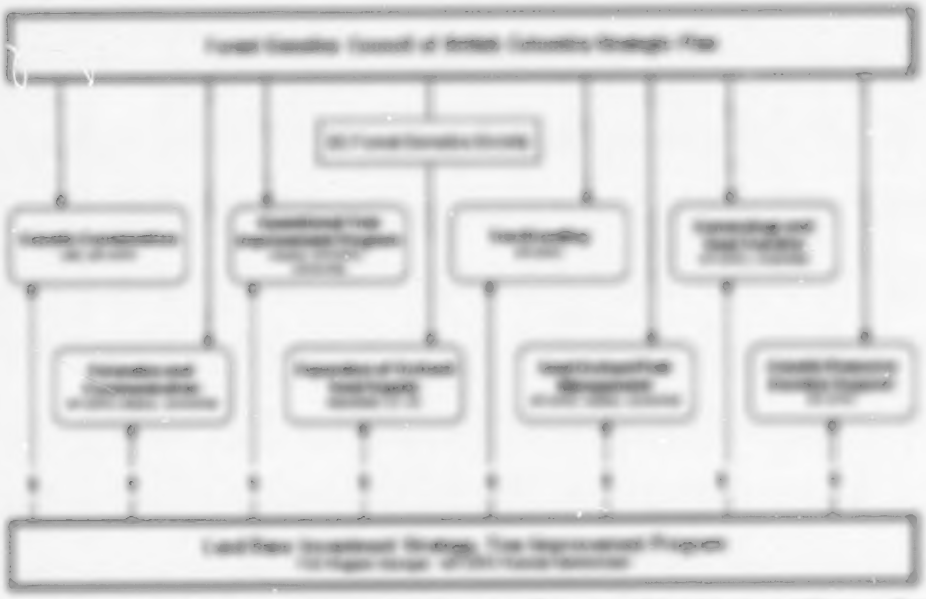

Figure 1 Relationship between the FGC Strategic Plan, Land Base Investment Strategy, Tree Improvement Program, and business plan development through FGC subprograms

2.0 Process for Business Plan Development

2.1 The Role of Council and its TACs

FGC members, representing the MFLNRO, forest companies, universities, the Canadian Forest Service, and small timber tenure holders, provide strategic direction to the provincial forest genetic resource management program. FGC Technical Advisory Committees provide technical and policy information to Council and contribute to the development of FGC plans and associated budgets. The FGC Business Plan consolidates the subprogram plans and budgets into a comprehensive set of activities that address Council's objectives.

Council's seven TACs lay the groundwork for the FGC Business Plan:

- The Coastal and Interior TACs review and advise on Tree Breeding and Operational Tree Improvement Program (OTIP) subprograms, and provide input to species plans that guide work done by Select Seed Company Ltd.
- The Genetic Conservation TAC (GCTAC) advises Council on issues related to genetic conservation, and identifies required activities and budgets under the Genetic Conservation Subprogram.
- The Seed Transfer TAC develops a strategy and activities for genecology research and climate-based seed transfer policy.
- The Extension TAC (ETAC) develops a strategy and annual activity plans for the Extension and Communication Subprogram.

- The Pest Management Unit (PMU) identifies information and research needs, and guides forest research and extension activities into the control of insect and disease pests impacting seed orchards and seed production.
- The Genetic Resources Decision Support Unit (GRDS) is [redacted] the development of priorities and budgets, that will provide information for seed users and others who are managing, using, or assessing seed inventories and the genetic resources.

In addition, Council establishes other committees as needed to advise on shorter-term projects.

Program financial administration is led by the [redacted] Improvement Branch. Program management, including business plan and annual report compilation, is led by [redacted] Forests for Tomorrow, on behalf of Council (see section 3.4 for more information on [redacted] and its relationship to the FGC).

Council reviews all strategies, plans, or recommendations that its FGU and Core Subcommittee approves or reviews before incorporating them into the FGC Business Plan. Figure 2 illustrates the hierarchical structure and the link between FGC objectives, planning processes, and the work undertaken through which it is implemented. The process for defining activities and budgets for work undertaken is discussed in section 4. Subprogram leaders are authorized to reallocate funds within their subprograms as necessary throughout the fiscal year, subject to checks and review process.

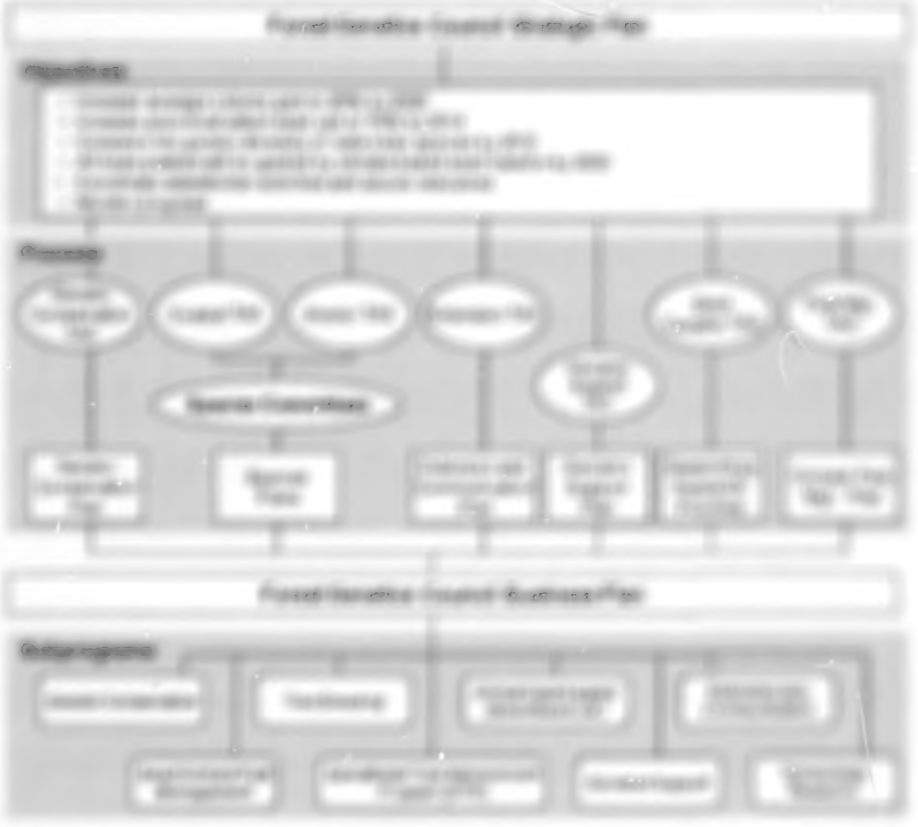

Figure 2 Link between FGC objectives, planning processes, and the subprograms in the FGC Business Plan

3.6 Subprogram Planning and Management

3.6 Genetic Conservation Subprogram

Genetic conservation of [illegible] species and ecological genetic resources for indigenous tree species, research in conservation [illegible], model and trends, provide training and technical information for non-commercial agencies, and provide guidance to the FGC and the DEPI/DNRE on policy development.

3.6.1 Planning

Genetic conservation activities are developed through the FGC Genetic Conservation (GC) (STAC), with programs and spending approved by the FGC.

3.6.2 Management

Management delivers a partnership delivered by the Forest Conservation Scientist and the Silviculture and GC STAC, and the Improvement Research of the DEPI/DNRE. The Silviculture Unit report to the Improvement Research coordinator on the seed inventory. The GC STAC and Silviculture subprogram budget is summarised in the FGC.

The FGC receives funding from the DEPI/DNRE under the DEPI Improvement Program. In addition, the Centre collaborates with other groups and agencies, and seeks funding from other sources on opportunities arise. Significant adjustments to commission objectives or budgets for [illegible] receiving annual funding through the DEPI must be approved by the FGC.

3.6.3 Activities and Budget

Investments through the GCS allow the leveraging of funds with other community, national, and international agencies in the area of conservation genetics. The focus for 2018-19 will continue on climate modelling of Mountain Ash and Shining Gum in collaboration with ILO in addition of other modelling for the Otway Forest project, primarily through Honours' projects. The climate modelling work is a collaboration for many Honours / Masters theses projects being undertaken in VIC and in some other jurisdictions. Other projects include assessing the genetic diversity of Silver Ash and Mountain Ash in Victoria, implement genetic conservation trends and strategies. These projects can also leveraged through other forest work with ILO, done by students associated with the GCS. The GCS will use the same development of a provenance trial that Regents and will receive partial funding for this ongoing project through the Genetic Conservation Indigenous. Collaborative work in assessing seedling knowledge on the adaptive genetic diversity of species indigenous to VIC will continue.

In the 2018-19 fiscal year, the Centre will receive $ 438,000 for program inputs in Table 1. In addition, the Centre will continue to provide expertise on climate change impacts, seed transfer options, and ongoing planning and policy development related to climate change.

A budget of $ 438,000 is allocated to the Forest Genetics section of the Tree Improvement Branch for field testing the distribution and climate and maintenance, seeds production up to [illegible] operational area, collaborative conservation trials, and maintenance of trees, and will operate out of the Centre's central resources at the Creswick site. Projects in Victoria, mostly undertaken in the Silviculture Framework has been funded under the additional to the seven collaborative in Region of the existing collective and the assistance, contract administrations in existing to seven and evaluation collaborations. The Australian Science Region of the DEPI/DNRE with in-year $ 438,000 for Genetic Conservation as established and seedlings as well as in progress for field work which the research and maintenance to assembly of existing collaborative and consolidations.

Table 1 [redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

10.3 Planning

[redacted]

[redacted]

10.4 Management

[redacted]

10.5 Activities and Strategies

[redacted]

[redacted]

Table 1: [redacted]

[redacted]	[redacted]	[redacted]	[redacted]
[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

3.3 Operational Tree Improvement Program (OTIP)

The OTIP subprogram supports FGC objectives to increase the quality and quantity of select seed produced from existing private and MFLNRO seed orchards. It also provides technical support for orchard production and management.

3.3.1 Planning

OTIP investment is based on input from the Interior and Coastal TICs and on species plans (Appendix 3) that outline seed production strategies within each GPU. Based on these strategies, and on priority lists approved by the TICs, a formal call for proposals is issued.

Review committees set up by the Interior and Coastal TICs review and rank all proposals against FGC objectives and GPU priorities, based on technical merit, impact, value, and cost. OTIP projects are selected to increase the genetic gain in seed made available for reforestation and to increase the quantity of seed produced from existing orchards. They support FGC short-term objectives for gains in the growth rate, pest resistance, and wood quality of reforestation materials. They also support FGC long-term objectives through the replacement of trees in existing seed orchards with trees of higher genetic value. The total budget allocation for OTIP is recommended by the FGC to the provincial Chief Forester and LRS managers in the MFLNRO.

3.3.2 Management

The MFLNRO Tree Improvement Branch administers OTIP in accordance with recommendations from the FGC. Requests for re-allocations or for new funding are considered by the MFLNRO Tree Improvement Branch Director in consultation with the appropriate TIC Chair and the FGC Program Manager. All projects report on key performance indicators to enable tracking of planned activities.

3.3.3 Activities and Budget

The 2018/19 OTIP budget is $[redacted] (Table 3). Approved projects primarily focus on activities such as protecting 2018 cone and seed crops from pests, improving the genetic worth of orchards through the roguing and replacement with higher gain material, and technical support to find solutions to ongoing seed orchard management problems. Project details, performance indicators, and support tools are available upon request from the Tree Improvement Branch.

Table 3 Operational Tree Improvement Subprogram (OTIP) budget requested and approved for the coast and interior areas

Area	No. proposals received	Total funding requested	Total approved funding	No. proposals receiving some level of funding
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

3.4 Expansion of Orchard Seed Supply Subprogram (SelectSeed Co. Ltd.)

SelectSeed Company Ltd. (SelectSeed) is a registered company that is wholly owned by the Forest Genetics Council through the B.C. Forest Genetics Society. All Society members are on Council. The SelectSeed Board of Directors is elected by Society members (Figure 3). 1. ,lectSeed's mission is to "support Forest Genetics Council objectives for the development of seed orchard facilities to meet the provincial demand for high quality, genetically adapted tree seed through investments, cooperative work with FGC members and effective program management."

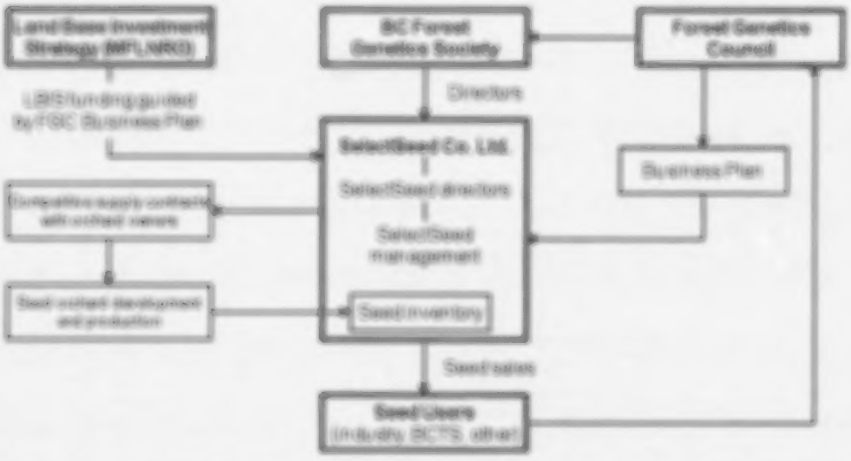

Figure 3 Organizational relationships among SelectSeed, Land Base Investment Strategy, Forest Genetics Council, and the B.C. Forest Genetics Society

3.4.1 Planning

SelectSeed's Business Plan and investments are based on the long-term Strategic Plan and annual business plans prepared by the FGC and its associated committees. Species plans (Appendix 3) contain analyses of projected orchard expansion needs that guide SelectSeed investments. Specific technical advice is sought as required from Species Committees or others.

3.4.2 Management

Management discretion for spending lies with the SelectSeed Board of Directors, and is limited by the terms of the SelectSeed Multi-Year Agreement with the MFLNRO. Investments in new orchards will be approved by the FGC and follow FGC and TAC guidance, with emphasis on both the technical quality of developments and on cost. SelectSeed's annual business plan was approved by the Forest Genetics Council on March 19, 2014.

3.4.3 Activities and Budget

In 2014/15, SelectSeed will focus on the management of 12 long-term orchard agreements covering the operation of 15 orchards (Table 5), including a new Douglas-fir orchard for higher elevations in the Thompson Okanagan zone that will be partially established during the fiscal year.

Seed orchard management activities to maximize seed crop production will continue in the 14 original orchards. In addition, about 289 ramets will be planted across all orchards to replace mortality and about

200 grafts will be made for future mortality replacement and for development of the new Douglas-fir orchard for the Thompson Okanagan high elevation SPU. All grafting and holding work is done through contracts. Seed production for 2014 is forecast at 75 kilograms of lodgepole pine, 76 kilograms of Douglas-fir, and 27 kilograms of spruce. Expected gross revenue from seed sales are forecast at $820,000.

Other activities will include program management on behalf of the Forest Genetics Council, including Business Plan and budget development, committee support, managing program development and subprogram interactions, and preparation of mid-term and annual reports.

Forecast spending for 2014/15 is $903,500 (table 4), including $152,400 for FGC management and support activities. Seed production forecasts are based on long-term production estimates for similar orchards, but annual production can vary widely.

Table 4 SelectSeed Company Ltd. 2014/15 forecast income and expenses by category

Category description	Total	Q1	Q2	Q3	Q4
COSTS					
Orchard rent contracts and capital investments	367,000	36,700	146,800	36,700	146,800
Propagation, holding, and orchard support	25,000	-	-	15,000	10,000
Crop management, seed extraction, sales	190,000	-	9,500	161,500	19,000
Management and administration	159,000	39,650	39,650	39,650	39,650
Cone and seed sampling for pest research trial	10,000	-	5,000	5,000	-
Total SelectSeed costs	$ 750,500	$ 76,350	$ 195,950	$ 252,850	$ 215,450
FGC management and support					
Management, legal, communication	152,400	38,100	38,100	38,100	38,100
Total FGC costs	$ 152,400	$ 38,100	$ 38,100	$ 38,100	$ 38,100
Total expenditures	$ 903,000	$ 114,450	$ 234,050	$ 290,950	$ 253,550
INCOME					
Seed sales	820,000	-	-	246,000	574,000
Interest on investments	12,000	3,000	3,000	3,000	3,000
Payment for pest research trial	10,000	-	-	-	10,000
Total income	$ 842,000	$ 3,000	$ 3,000	$ 249,000	$ 577,000
Net revenue without FGC costs	$ 91,400	$ (73,350)	$ (192,850)	$ (3,850)	$ 361,550
Net revenue with FGC costs	$ (61,000)	$ (111,450)	$ (231,050)	$ (41,950)	$ 323,450
Cash from (to) income	$ 61,000				
Requested MFA Support	$ -				

3.5 Extension and Communication

The Extension and Communication Subprogram supports FGC goals and objectives through:

- extension (providing client-focused solutions and training to seed users and tree improvement specialists),
- communication (developing and disseminating information on the program and its activities to all FGC target audiences),
- training.

3.5.1 Planning

Extension and communication activities are developed and guided by the FGC Extension Technical Advisory Committee (ETAC). ETAC includes representatives from the MFLNRO, forest licensees, and the private consulting community.

The ETAC extension and communication strategy is based on three broad goals:

1. To work closely with Council and its TACs to coordinate and manage extension efforts in support of Council's provincial genetic resource management program.
2. To provide information and policy advice to Council on issues related to extension
3. To act as a forum for user feedback.

3.5.2 Management

ETAC identifies goals and audiences for extension, communication and education activities, and with the assistance of an Extension Coordinator from the MFLNRO Tree Improvement Branch, develops a business plan. The Coordinator is responsible for the management of ETAC activities, and the coordination of ETAC work in conjunction with Council and other committees of Council. Projects are undertaken through contracts or through direct delivery by cooperators. Budget development for LBIS funds is first done by the ETAC, with final approval by the FGC. Project spending is approved by the ETAC Chair and the FGC Program Manager, and must meet administrative guidelines set out for LBIS funds. ETAC reports to Council on activities, progress, and spending at mid-year and year end.

3.5.3 Activities and Budget

The extension and communication budget for 2014/15 is $12,000. In-kind, staff time and other contributions by affiliated agencies and companies are incremental to this amount and are not listed. Projects and budgets are summarized in Table 5.

Table 5 Extension and communication projects and budget for 2014/15.

Project	Budget ($)
Publications	
- Tree Improvement in BC brochure - finalize and print	
- Lodgepole pine crop statistics and seed set summary - develop and print	4,000
- Field guide on white pine blister rust	
- Develop a brochure on climate adaptation in trees for ranchers and woodlot owners	
Extension events and workshops	
- Connect with existing silviculture committees to disseminate information on GRM	1,000
- Cone and seed pest management workshop	
Conference support; BC Seed Orchard Managers Assoc.; Poplar symposium	5,000
Administration and travel to support and coordinate extension events (D. Douglas - MFLNRO)	2,000
Total	$12,000

3.6 Genetic Resource Decision Support Subprogram

The Genetic Resource Decision Support Subprogram (GRDS) supports FGC goals and objectives through the development of genetic information management systems. These systems assist clients in decision making, seed policy and planning, seed use, timber supply analysis, effectiveness evaluation, monitoring, and other GRM activities.

3.6.1 Planning

GRDS projects are developed and guided by a Technical Advisory Committee (TAC) comprised of ministry, industry and academic representatives.

3.6.2 Management

The GRDS TAC identifies short- and long-term goals that support the GRM information needs of clients. Significant project changes or re-allocations of funds from the approved Business Plan require approval of the TAC and the FGC Program Manager on behalf of the FGC.

3.6.3 Activities and Budget

Priorities for the 2014/15 fiscal year are to continue to improve the ability of MFLNRO online systems to create, manage, display, and query seedlot area-of-use spatial information in support of climate-based seed transfer. Policy development and risk and impact assessments will undertaken to guide adjustments to existing seed transfer standards to accommodate climate-based seed transfer. In addition, the Climate-Based Seed Transfer project will continue to be managed and facilitated. A total of $115,000 is allocated to these projects (Table 6).

Table 6 Genetic Resource Decision Support projects and budget for 2014/15.

Project	Budget ($)
Geographic information system support for climate-based seed transfer development	45,000
Policy development, and risk and impact assessments for climate-based seed transfer	50,000
Climate-Based Seed Transfer project management and facilitatin	20,000
Total	$115,000

3.7 Cone and Seed Pest Management Subprogram

The Pest Management subprogram supports FGC objectives by reducing orchard seed losses to insect and disease pests through technical support, research, and the development of integrated pest management strategies in conjunction with orchard managers and pest management research and extension specialists.

3.7.1 Planning

The subprogram is guided by a Pest Management Technical Advisory Committee (PMTAC), with membership from industry, the MFLNRO, the Canadian Forest Service, and universities. Issues are identified and ranked by the PMTAC based on perceived impact on seed losses, and the effect of these seed losses on FGC objectives. The TAC also makes recommendations to Council regarding subprogram organization, management, and budgets.

3.7.2 Management

With direction from the PMTAC, research proposals and pest management support activities were developed by the MFLNRO cone and seed pest management specialists. These were subsequently reviewed by Pest Management TAC members, and recommendations made for project modifications. The PMTAC recommended projects and budgets to the FGC.

The MFLNRO Tree Improvement Branch manages budgets and the financial administration of projects recommended by the PMTAC and approved by the FGC. Significant priorities and changes during the fiscal year are made in consultation with the PMTAC and the FGC Program Manager.

3.7.3 Activities and budget

The total Pest Management subprogram budget for 2014/15 is $80,670. In-kind, staff time and other contributions by affiliated companies and agencies are incremental to this amount. Projects and budgets are summarized in Table 7.

Table 7 Cone and Seed Pest Management Subprogram projects for 2014/15.

Project	Species impacted	Budget ($)	Products
Operational Support for the MFLNRO Cone & Seed Pest Biologist (Corrigan)	All species	21,500	Extension, pest mgt. bulletins, project support
Laboratory pesticide trials of Matador and Sevin on *Leptoglossus occidentalis* (Strong)	Pli, Fdi	3,927	Final report
Support for Ministry Cone & Seed Pest Research Laboratory (Strong)	Sx, Fdi, Fdc, Lw, Pw	5,250	Ongoing trial support; progress report
Matador area-wide operational trials to assess the impact of *Leptoglossus occidentalis* population reductions on filled seed production in lodgepole pine orchards (SelectSeed Ltd. - Woods)	Pli	9,200	Final report
Lodgepole pine clonal preference by *Leptoglossus occidentalis*. Project in conjunction with and partly funded by the UBC Bohlmann lab	Pli	13,230	Progress report
Minor Use Pesticide Trials assessing Delegate against fir coneworm in individual-tree experiments. Funded in conjunction with the federal Pest Management Regulatory Agency	Pli	27,563	Progress report
Total budget		$ 80,670	

3.8 Genecology and Seed Transfer Subprogram

The purpose of the Genecology and Seed Transfer Subprogram is to effectively direct funding to priority genecology and seed transfer projects in support of FGC strategic objectives and provincial seed transfer policy development.

3.8.1 Planning

The subprogram is guided by the Seed Transfer TAC (STTAC), with representation from MFLNRO, industry, and university stakeholders. Priorities for genecology and seed transfer information needs are set within the context of other work currently underway, such as in the Breeding Subprogram, existing genecology trials, and seed transfer policy needs. The STTAC reviews priorities and projects set out by MFLNRO Tree Improvement Branch (TIB) scientists, leads the development of a call for proposals for non-MFLNRO projects, and makes recommendations to the FGC regarding budgets, priorities, and delivery process.

3.8.2 Management

The STTAC developed a list of priorities for genecology and seed transfer projects by species and type of work. Based on these priorities, a business plan was compiled by TIB scientists and reviewed by a review committee on behalf of the STTAC. In addition, a call for proposals was released by the TIB on behalf of the STTAC and proposals were screened by a review committee of the STTAC. Funding recommendations were made to the FGC

The MFLNRO Tree Improvement Branch manages financial administration for approved projects through either direct spending within the Branch or through contracts with successful project proponents. Project financial and progress reporting is managed through the TIB, and incorporated in annual FGC reports.

3.8.3 Activities and budget

The total budget allocated to the Genecology and Seed Transfer Subprogram for 2014/15 is $265,000. This amount falls into two primary categories:

1. Successful proposals from a proposal call open only to proponents outside the MFLNRO - $45,670 (Table 8).
2. Projects led by scientists from the MFLNRO TIB, including the Assisted Migration Adaptation Trial - $219,330 (Table 9). This budget may be extended through risk management, as the discretion of the Tree Improvement Branch.

Table 8 Genecology and Seed Transfer Subprogram projects led by non-MFLNRO proponents and approved through a call for proposals.

Species	Project title	Budget ($)	Performance indicator
Sx, Pli	Assessing the adaptive portfolio or reforestation stocks for future climates: common garden experiments. The project is leveraged with an associated $1 million grant through the Genome Canada funded AdaptTree genomics project (UBC - Aitken).	$ 9,808	1 report
Cw	Identifying cedar blight resistance to develop durable and resistant western redcedar populations for future climates (UVic - Hawkins)	$ 20,850	1 report
All	Identifying critical soil moisture thresholds to support assisted migration practices and climate based seed transfer in central British Columbia (College of New Caledonia - Greisbauer)	$ 15,012	1 report
Total budget		**$ 45,670**	

Table 9 MFLNRO Tree Improvement Branch Genecology and Seed Transfer Subprogram project funding and priority activities by species for 2014/15.

Species	Budget ($ x 1000)	Priority activities
Lodgepole pine	32.2	Provenance trial post-MPB assessments
Interior Douglas-fir	-	Field trial maintenance
Western redcedar (coast)	0.0	
Coastal Douglas-fir	12.9	Field trial establishment and maintenance
Interior spruce	61.2	Field trial measurement and maintenance
Western hemlock	10.0	Field trial measurement and maintenance
Sub-alpine fir	10.0	Field trial measurement and maintenance
Western larch	-	
Western redcedar (interior)	15.5	Field trial establishment, measurement and maint.
Pacific silver fir	0.6	Field trial maintenance
Western white pine	-	
Yellow cypress	-	
Sitka spruce	9.0	Field trial measurement and maintenance
Red alder	9.7	Field trial establishment
Birch	-	
Grand fir	-	
Poplar	-	
Ponderosa pine	-	
Big-leaf maple	-	
Noble fir	-	
Assisted migration adaptation trial	40.2	Field trial measurement and maintenance
Totals	**219.3**	

* Assisted Migration Adaptation Trial: includes multiple species.

3.9 Applied Tree Improvement and Biotechnology

The Applied Tree Improvement and Biotechnology research program accepts proposals that support the objectives of the Forest Genetics Council of BC in the area of new technologies and their application to GRM in BC.

3.9.1 Planning

Project proposals received under this funding category are developed by proponents based on their knowledge of needs and opportunities within the broad provincial GRM program or on suggestions received from others active within the program. The intent is to provide a funding mechanism in support of projects that have the potential to contribute to FGC objectives but do not fit the more specific funding requirements of other FGC subprograms.

3.9.2 Management

Project proposals were received by the FGC Program Manager and reviewed by a Steering Committee reporting to the FGC. Criteria for project evaluation included the potential to contribute to FGC objectives, probability of success, proponent ability to meet project objectives, and cost. The Steering Committee considered project costs and reserved the right to suggest modifications to project activities or scope and to modify budgets, where they felt it was appropriate.

3.9.3 Projects and Budget

Only one proposal was received and reviewed for 2016/17. The Steering Committee recommended full funding for the project as both components addressed barriers to key seed use objectives of the Forest Genetics Council. Part one of this proposal will investigate the possibility that lodgepole pine filled seed losses in north Okanagan seed orchards is being at least partially caused by a fungus. Part two of the proposal will continue an ongoing project that is assessing hormonal treatment options for Douglas-fir and lodgepole pine to increase cone production. This project is being led through the University of Victoria.

3.10 Administration

Administration of the LBIS Tree Improvement Program is provided by the Tree Improvement Branch of the MFLNRO. There are three components to this work:

- the administration of LBIS funds allocated to subprograms managed by the MFLNRO, including Tree Breeding, OTIP, Genecology and Seed Transfer, Extension and Communication, Pest Management, and Genetic Resource Information Management;
- the administration of contracts with successful proponents through the OTIP, Genecology and Seed Transfer proposal calls, and with universities and Selectseed Company Ltd.;
- support for the business of the FGC, including scheduling meetings, assistance with information distribution, and dealing with queries and planning.

3.10.1 Costs

MFLNRO administration costs are reviewed by the FGC, and a recommendation is made for support under LBIS. The administration budget is approved by the FGC in conjunction with other LBIS Tree Improvement Program budget items.

3.10.2 Management

Overall program management is carried out on behalf of the Forest Genetics Council by the FGC Program Manager working for Selectseed Company Ltd. This work includes planning, coordination of committees, Business Plan development, reporting, correspondence, and representing the FGC in daily business. The MFLNRO Tree Improvement Branch provides administrative support, overall financial management, and assistance with the coordination of FGC business.

3.10.3 Activities and Budget

The 2016/17 budget for the Administration Subprogram is $10,000. This amount includes all program administration costs incurred by the MFLNRO Tree Improvement Branch.

3.11 Budget Summary

A Land Base Investment Strategy Tree Improvement Program budget allocation of [redacted] is approved for the 2014/15 fiscal year, and is summarized in Table 10. An additional approximately [redacted] will be contributed by Council-owned SelectSeed Ltd. to cover program management, overhead costs, seedlots, publications, and other support work.

Table 10 2014/15 budget summary for LBIS Tree Improvement Program contributions to subprograms

Subprogram	Allocation
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

4.0 Funding and Administrative Mechanisms

4.1 Funding Agreements

The Land Base Investment Strategy Tree Improvement program is administered by the Tree Improvement Branch of the NYSDEC. FGC Business Plan activities are supported through the following administrative mechanisms:

- NYSDEC/SaberHawk Co. Ltd. Multi-Year Agreement
- NYSDEC contracts
- NYSDEC/University grants and transfers
- NYSDEC direct management and administration

The subprograms associated with each of the mechanisms are shown in Figure 4. Resources from other agencies include in-kind facilities, staff and direct funds. Seed sales (both wholesale and private) revenue to support seed production. Only Land Base Investment Program funding and associated full budgets are detailed in this Business Plan.

Figure 4: Administrative mechanisms for the delivery of the Land Tree Improvement Program funding.

6.0 Monitoring and Reporting

Monitoring progress is an important objective of the [redacted] program. [redacted] includes activities aimed at performance relative to [redacted]. In addition, progress towards [redacted] objectives is assessed [redacted] the [redacted] activities.

6.0.1 Project Level Reporting

Project-level audit observations are to be reported [redacted] the annual [redacted] Improvement Program Report [redacted]. Audit quality will be [redacted] through [redacted] monitoring and [redacted] reports. Regular [redacted] assessments, [redacted] reviews, [redacted] or ongoing monitoring [redacted] as appropriate, [redacted] to the [redacted] Program Administrator, [redacted] Program Manager, [redacted] to the [redacted] Program Administrator, or reporting [redacted] [redacted] [redacted] program activities [redacted] [redacted].

6.0.2 Functional Level Reporting

Progress towards the [redacted] objectives [redacted] [redacted] functional [redacted] [redacted] monitoring [redacted] [redacted] [redacted]

Appendix 1: Seed Planning Units and Categories

The following table lists each planning unit (PU) and its primary categories. Where a unit falls in an overlap zone between two categories, the dominant category is listed first. Seed collectors should consult the relevant PU before visiting a site, and should not collect from sites not listed here without prior written approval from the Research Coordinator.

Category categories include:

- 1 — Broadleaf, agricultural categories
- 2 — Coniferous categories (only)
- 3 — Mixed stands, woodland edge, scrub
- 4 — Ex-agricultural, unplanted land, or other categories not listed above

PU	Category	Area (ha)	Map reference	Notes
1	1	14.2	SK 3812 7045	
2	1	9.8	SK 3820 7051	
3	1	22.5	SK 3831 7062	
4	1	6.1	SK 3844 7070	
5	1	31.0	SK 3858 7081	
6	1	18.4	SK 3871 7094	
7	1	11.7	SK 3885 7102	
8	1	27.3	SK 3899 7115	
9	1	8.9	SK 3912 7128	
10	1	15.6	SK 3926 7140	
11	1	42.0	SK 3940 7153	
12	1	19.2	SK 3954 7166	
13	1	7.4	SK 3967 7179	
14	1	24.8	SK 3981 7191	
15	1	33.1	SK 3995 7204	
16	1	12.0	SK 4008 7217	
17	1	5.5	SK 4022 7230	
18	1	16.7	SK 4036 7243	
19	1	29.4	SK 4049 7256	
20	1	9.2	SK 4063 7268	
21	1	21.0	SK 4077 7281	
22	1	13.8	SK 4090 7294	
23	1	38.6	SK 4104 7307	
24	1	6.0	SK 4118 7320	
25	1	17.3	SK 4131 7333	
26	1	25.5	SK 4145 7345	
27	1	10.1	SK 4159 7358	
28	1	14.9	SK 4172 7371	
29	1	8.4	SK 4186 7384	
30	1	19.0	SK 4200 7397	
31	1	22.7	SK 4213 7410	
32	1	11.3	SK 4227 7422	
33	1	7.8	SK 4240 7435	
34	1	16.2	SK 4254 7448	
35	1	28.0	SK 4268 7461	
36	1	9.6	SK 4281 7474	
37	1	13.4	SK 4295 7487	
38	1	20.1	SK 4309 7499	
39	1	6.7	SK 4322 7512	
40	1	15.0	SK 4336 7525	
41	1	24.3	SK 4350 7538	
42	1	8.1	SK 4363 7551	
43	1	17.6	SK 4377 7564	
44	1	31.2	SK 4390 7577	
45	1	10.4	SK 4404 7589	
46	1	12.9	SK 4418 7602	
47	1	5.2	SK 4431 7615	
48	1	18.8	SK 4445 7628	
49	1	26.7	SK 4459 7641	
50	1	9.0	SK 4472 7654	
51	1	14.1	SK 4486 7667	
52	1	22.4	SK 4499 7680	
53	1	7.6	SK 4513 7692	
54	1	16.5	SK 4527 7705	
55	1	29.8	SK 4540 7718	
56	1	11.0	SK 4554 7731	
57	1	13.7	SK 4567 7744	
58	1	20.6	SK 4581 7757	
59	1	6.4	SK 4595 7770	
60	1	15.3	SK 4608 7782	
61	1	24.0	SK 4622 7795	
62	1	8.8	SK 4635 7808	
63	1	17.1	SK 4649 7821	
64	1	31.5	SK 4663 7834	
65	1	10.7	SK 4676 7847	
66	1	12.4	SK 4690 7860	
67	1	5.9	SK 4703 7872	
68	1	18.2	SK 4717 7885	
69	1	26.1	SK 4731 7898	
70	1	9.3	SK 4744 7911	
71	1	14.6	SK 4758 7924	
72	1	22.9	SK 4771 7937	
73	1	7.2	SK 4785 7950	
74	1	16.0	SK 4799 7963	
75	1	29.3	SK 4812 7975	
76	1	11.5	SK 4826 7988	
77	1	13.2	SK 4839 8001	
78	1	20.4	SK 4853 8014	
79	1	6.6	SK 4867 8027	
80	1	15.8	SK 4880 8040	
81	1	24.6	SK 4894 8053	
82	1	8.5	SK 4907 8065	
83	1	17.4	SK 4921 8078	
84	1	31.8	SK 4935 8091	
85	1	10.2	SK 4948 8104	
86	1	12.7	SK 4962 8117	
87	1	5.4	SK 4975 8130	
88	1	18.5	SK 4989 8143	
89	1	26.4	SK 5003 8156	
90	1	9.1	SK 5016 8168	
91	1	14.4	SK 5030 8181	
92	1	22.6	SK 5043 8194	
93	1	7.0	SK 5057 8207	
94	1	16.3	SK 5071 8220	
95	1	29.6	SK 5084 8233	
96	1	11.2	SK 5098 8246	
97	1	13.5	SK 5111 8258	
98	1	20.3	SK 5125 8271	
99	1	6.3	SK 5139 8284	
100	1	15.1	SK 5152 8297	

Seed zones are allocated from trees in that respect for new research deliveries, or to replace losses. Contact the Research Coordinator if this reference plan is found to be incorrect or incomplete.

Appendix 5: Forest Education Council and Technical Advisory Committee Members

Forest Education Council in 2018

Name	Affiliation	Representing
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

Forest Technical Advisory Committee

Name	Affiliation	Name	Affiliation
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Advisory Committee Members in 2018

Name	Affiliation	Name	Affiliation
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Genetic Conservation Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Dr. Pat Smith (Chair)	FLNRO Tree Imp. Branch	Dr. Michael Murray	FLNRO S Region
Dr. Sally Aitken	University of BC	Dr. Tony Stevens	Ministry of Environment
Charlie Cartwright	FLNRO Tree Imp. Branch	Alan Iszkin	Independent
Dr. Andrew Hamann	University of Alberta	Dr. Tongli Wang	University of BC
Dr. Joh-Joh Liu	Canadian Forest Service	Dr. Alvin Yanchuk	FLNRO Tree Imp. Branch
Dave Kolotelo	FLNRO Tree Imp. Branch		

Extension Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Diane Douglas (Chair)	FLNRO Tree Imp. Branch	Roger Planter	SelectSeed Ltd.
Dr. Sally Aitken	University of BC	Kathie Swift	FORREX
Tyler Brown	Western Forest Products Ltd.	Dave Trotter	Min. of Agriculture
Charlie Cartwright	FLNRO Tree Imp. Branch	Nick Ukrainetz	FLNRO Tree Imp. Branch
Mary Graham	FLNRO Tree Imp. Branch	Tia Wagner	Tolko Ltd.
Peter McKinnon	FLNRO Tree Imp. Branch		

Pest Management Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Stephen Joyce (Chair)	FLNRO, Tree Imp. Branch	Dr. Mark Wong	FLNRO Tree Imp. Branch
Jon Corrigan	FLNRO, Tree Imp. Branch	Dr. Jean Turgeon	Canadian Forest Service
Jenny Cory	Seven Power Line	Tia Wagner	Vernon Seed Orch. Co.
Gary Gaimon	MFLNRO, Tree Imp. Branch	Kevin Wightman	TimberWest Forests Ltd.
Mary Graham	FLNRO Tree Imp. Branch		

Decision Support Advisory Committee

Name	Affiliation	Name	Affiliation
Ing Bonsteel (Chair)	West Fraser Timber Ltd.	Matt Lathy	FLNRO Harvesting and Silv. Practices Branch
Lee Charleson	MFLNRO Tree Imp. Branch	Michael Yeatma	FLNRO Tree Imp. Branch
Cathy Cook	Western Forest Products Inc.	Rob Vander	Canadian Forest Products Ltd.
Dan Gaudet	Vernon Seed Orchard Company	Susan Zedel	FLNRO Tree Imp. Branch

Seed Transfer Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Lee Charleson (Chair)	FLNRO Tree Imp. Branch	Leslie McAuley	FLNRO Tree Imp. Branch
Dr. Sally Aitken	University of BC	Dr. Greg O'Neill	FLNRO Tree Imp. Branch
Ing Bonsteel	West Fraser Timber Ltd.	Jason Regnier	West Fraser Timber Ltd.
Diane Douglas	FLNRO Tree Imp. Branch	Nick Ukrainetz	FLNRO Tree Imp. Branch
Scott King	Louisiana Pacific Ltd.	Annette van Niejenhuis	Western Forest Products Inc.

Appendix 3: Species Plans

Species plans present information for seed planning units with active or planned breeding programs, seed orchards, or genecology work, including SPUs that are not supported through LBIS Tree Improvement Program funding. Information presented includes breeding strategy (where applicable), seed orchard production forecasts, gain forecasts, historic seed use, seed in storage, genetic conservation status, and genecology/seed transfer projects. The plans are organized by species.

Species plans are available online at
http://www.for.gov.bc.ca/hti/speciesplans/index.htm